Claim Listing:

1. (Previously Presented) A method of monitoring polymer array synthesis on a solid substrate comprising:

(i) synthesizing a preselected array of diverse biological polymers connected to cleavable linkers on a solid substrate, whereby the diverse biological polymers occupy different regions of the substrate and are spatially defined on the solid substrate on which the preselected array is synthesized, and wherein the diverse biological polymers comprise nucleotides, nucleosides, phosphoramidites, carbohydrates or natural or synthetic amino acids;

(ii) cleaving diverse biological polymers from the solid substrate by cleaving the cleavable linkers, thereby creating a mixture of diverse unbound biological polymers; and

(iii) measuring presence of diverse unbound biological polymers as an indicator of the efficiency of the synthesizing step.

2. (Previously Presented) The method of claim 39, wherein each of the labeled polymers comprises a single isomeric label.

3. (Previously Presented) The method of claim 39, wherein the labeled unbound polymers are heterogeneous by number of monomeric units, and wherein the method further comprises separating the labeled unbound polymers by number of monomeric units.

4. (Previously Presented) The method of claim 39, wherein the labeled unbound polymers are heterogeneous by number of monomeric units, and wherein the method further comprises separating the labeled unbound polymers by charge using ion exchange chromatography.

5. (Previously Presented) The method of claim 39, wherein each of the labeled unbound polymers are heterogeneous by number of monomeric units, and wherein the method further comprises separating the labeled unbound polymers by number of monomeric units using capillary gel electrophoresis.

6. (Original) The method of claim 4, wherein the ion exchange chromatography is performed by HPLC.

7. (Original) The method of claim 4, wherein the ion exchange chromatography is performed by HPLC, and wherein the labeled unbound polymers are detected as they exit an ion exchange column.

8. (Original) The method of claim 1, wherein the polymer is an oligonucleotide.

9. (Cancelled)

10. (Currently Amended) A method for measuring the effect of altering a polymer array synthesis protocol, comprising:

(i) synthesizing a preselected array of diverse biological polymers occupying different regions on a solid support by a first synthesis protocol, wherein the diverse biological polymers are spatially defined on the solid support on which the preselected array is synthesized, thereby creating a reference array of biological polymers, wherein the diverse biological polymers comprise nucleotides, nucleosides, phosphoramidites, carbohydrates or natural or synthetic amino acids;

(ii) synthesizing a preselected array of diverse biological polymers occupying different regions on a solid support synthesized by a second synthesis protocol, wherein the diverse biological polymers are spatially defined on the solid support on which the preselected array is synthesized, and wherein the second synthesis protocol is different than the first synthesis protocol, thereby creating a test array of biological polymers; wherein biological polymers of the test array are preselected to be the same as preselected biological polymers of the reference array;

(iii) cleaving separately the reference array of biological polymers and the test array of biological polymers, thereby creating a mixture of diverse cleaved biological polymers from the reference array and a mixture of diverse cleaved biological polymers from the test array;

(iv) comparing a measurement of presence of diverse cleaved biological polymers from the test array as an indicator of the efficiency of the second synthesis procedure with a measurement of presence of diverse cleaved biological polymers from the reference array as an indicator of the efficiency of the first synthesis procedure, thereby determining whether a difference between the first and second synthesis procedure affects the efficiency of the second synthesis procedure.

11. (Original) The method of claim 10, wherein the test and reference polymers are oligonucleotides.

12. (Original) The method of claim 10, wherein the first synthesis protocol differs from the second synthesis protocol by a single variation.

13. (Original) The method of claim 10, wherein the reference polymers and the test polymers are attached to the solid substrate by a cleavable linker.

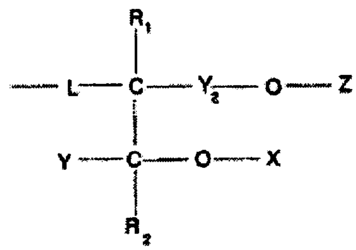
14. (Original) The method of claim 10, wherein the test and reference polymers comprise a detectable label.

15. (Previously Presented) The method of claim 14, wherein the label is a single isomeric label.

16. (Withdrawn) A detectable monomeric polymer synthesis reagent with the structure A-B, wherein A comprises a detectable chromogenic moiety and B comprises a polymer integration element, said integration element comprising a polymer joining agent selected from the group consisting of an amine; a carboxyl; an oxygen; and a phosphate; and wherein A-B is a single isomer.

17. (Withdrawn) The polymer synthesis reagent of claim 16, wherein the chromogenic moiety is a fluorophore.

18. (Withdrawn) The polymer synthesis reagent of claim 16, wherein the polymer synthesis reagent is a nucleic acid synthesis reagent, wherein B comprises the structure



and wherein

L is a linking chain selected from the group of linking chains consisting of an alkyl linking chain from 1 to 30 carbons in length, wherein one or more carbon is optionally substituted with a heteroatom selected from the group consisting of N, S, O and P, and wherein the alkyl linking group optionally includes one or more sites of unsaturation, an alkyl linking chain from 1 to 30 carbons in length, wherein one or more carbon is optionally replaced with a heteroatom selected from the group consisting of N, S, O and P, and wherein the alkyl linking group optionally includes one or more sites of unsaturation;

R_1 is selected from the group consisting of hydrogen, alkyl, and aryl;

R_2 is selected from the group consisting of hydrogen, alkyl, and aryl;

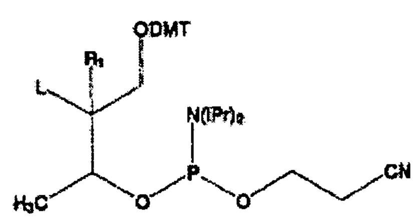
X is a nucleic acid integration element comprising a phosphorous atom,

Y is selected from the group consisting of hydrogen, alkyl, and aryl;

Y_2 is an alkyl chain; and

Z comprises a protecting group.

19. (Withdrawn) The polymer synthesis reagent of claim 16, wherein the polymer synthesis reagent is a nucleic acid synthesis reagent, wherein B comprises the structure



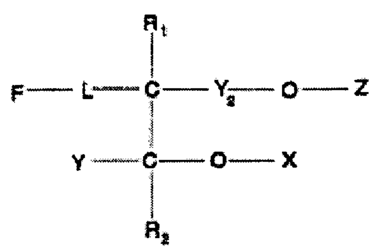
and wherein

L is selected from the group of alkyl linking chains consisting of an alkyl linking chain from 1 to 30 carbons in length, wherein one or more carbon is optionally substituted with a heteroatom selected from the group consisting of N, S, O and P, and wherein the alkyl linking group optionally includes one or more sites of unsaturation, and an alkyl linking chain from 1 to 30 carbons in length, wherein one or more carbon is optionally replaced with a heteroatom selected from the group consisting of N, S, O and P, and wherein the alkyl linking group optionally includes one or more sites of unsaturation; and

R_1 is selected from the group consisting of hydrogen, alkyl, and aryl.

20. (Withdrawn) A labeled oligonucleotide array attached to a solid substrate, wherein the oligonucleotides of the array comprise a single isomer of a detectable label.

21. (Withdrawn) A labeled oligonucleotide array attached to a solid substrate, wherein the label is a monoisomeric label comprising the structure



wherein

F comprises a fluorescent group.

L is selected from the group of alkyl linking chains consisting of an alkyl linking chain from 1 to 30 carbons in length, wherein one or more carbon is optionally substituted with a heteroatom selected from the group consisting of N, S, O and P, and wherein the alkyl linking group optionally includes one or more sites of unsaturation, and an alkyl linking chain from 1 to 30 carbons in length, wherein one or more carbon is optionally replaced with a heteroatom selected from the group consisting of N, S, O and P, and wherein the alkyl linking group optionally includes one or more sites of unsaturation;

R_1 is selected from the group consisting of hydrogen, alkyl, and aryl;

R_2 is selected from the group consisting of hydrogen, alkyl, and aryl;

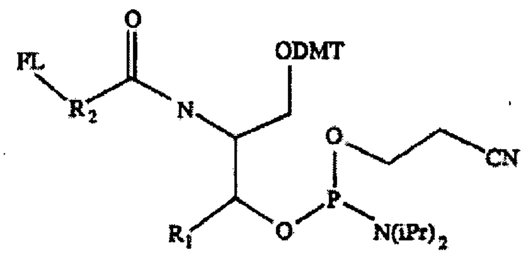
X is a nucleotide or a cleavable linker;

Y is selected from the group consisting of hydrogen, alkyl, and aryl;

Y_2 is selected from the group consisting of a hydrocarbon chain and a substituted hydrocarbon chain; and,

Z is selected from the group consisting of a nucleotide and a nucleic acid.

22. (Withdrawn) The nucleic acid synthesis reagent of claim 21, wherein the nucleic acid synthesis reagent has the structure



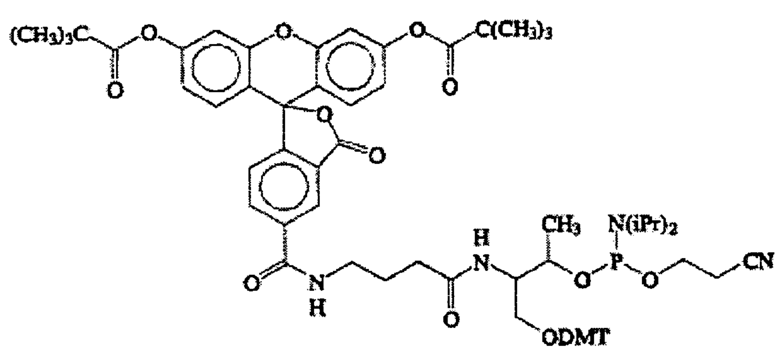
wherein

R_1 is selected from the group consisting of alkyl, aryl, and hydrogen;

R_2 is selected from the group consisting of alkyl, and aryl; and

FL is a fluorescent moiety.

23. (Withdrawn) The isomeric nucleic acid synthesis reagent of claim 21, wherein the compound has the structure



24. (Withdrawn) The array of claim 21, wherein the composition further comprises a cleavable linker.

25. (Withdrawn) A method of post-synthetically labeling an oligonucleotide array, comprising:

(i) providing a polymer array which comprises a plurality of polymers, wherein each polymer comprises a labeling site; and

(ii) attaching a detectable label to the labeling site.

26. (Withdrawn) The method of claim 25, wherein the detectable label comprises a fluorophore.

27. (Withdrawn) The method of claim 25, wherein step (i) of said method comprises synthesizing a polymer array, which polymer array comprises polymers attached to a substrate, said polymers comprising a labeling linker, which labeling linker comprises an attachment site for the detectable label.

28. (Withdrawn) The method of claim 25, wherein step (i) of said method comprises synthesizing a polymer array, which polymer array comprises polymers attached to a substrate, said polymers comprising a cleavable linker and a labeling linker, which labeling linker comprises an attachment site for the detectable label, a site for attachment to the cleavable linker and a protected site for the attachment of the detectable label.

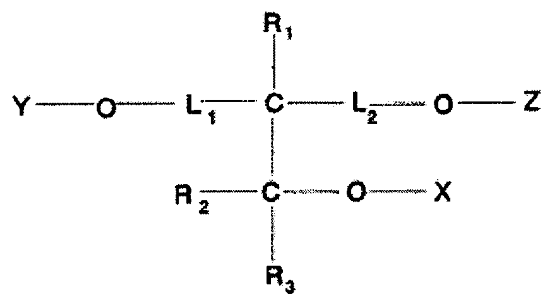
29. (Withdrawn) The method of claim 25, wherein step (i) of said method comprises synthesizing a polymer array, which polymer array comprises polymers attached to a substrate, said polymers comprising a cleavable linker and a labeling linker, which labeling linker comprises a protected attachment site for the detectable label, and wherein step (ii) of the method comprises deprotecting the labeling linker, thereby making the protected attachment site into an unprotected attachment site, and incubating the polymer array with a detectable labeling reagent, which detectable labeling reagent comprises a site which is reactive with the unprotected attachment site, and which labeling reagent comprises the detectable label.

30. (Withdrawn) The method of claim 29, wherein said protected attachment site comprises a DMT protective group.

31. (Withdrawn) The method of claim 25, wherein said labeling site is located proximal to a cleavage site in the polymers of the polymer array.

32. (Withdrawn) A post-synthetic labeling linker which comprises a site for polymer elongation, a site for attaching a polymer to a substrate and an attachment site for attaching a detectable label.

33. (Withdrawn) The labeling linker of claim 32, wherein the linker has the structure



wherein:

R_1 is selected from the group consisting of hydrogen, alkyl and aryl;

R_2 is selected from the group consisting of hydrogen, alkyl and aryl;

R_3 is selected from the group consisting of hydrogen, alkyl and aryl,

L_1 is a linking chain selected from the group of alkyl linking chains consisting of an alkyl linking chain from 1 to 30 carbons in length, wherein one or more carbon is optionally substituted with a heteroatom selected from the group consisting of N, S, O and P, and wherein the alkyl linking group optionally includes one or more sites of unsaturation, and an alkyl linking chain from 1 to 30 carbons in length, wherein one or more carbon is optionally replaced with a heteroatom selected from the group consisting of N, S, O and P, and wherein the alkyl linking group optionally includes one or more sites of unsaturation;

L_2 is a linking chain selected from the group of alkyl linking chains consisting of an alkyl linking chain from 1 to 30 carbons in length, wherein one or more carbon is optionally substituted with a heteroatom selected from the group consisting of N, S, O and P, and wherein the alkyl linking group optionally includes one or more sites of unsaturation, and an alkyl linking chain from 1 to 30 carbons in length, wherein one or more carbon is optionally replaced with a

heteroatom selected from the group consisting of N, S, O and P, and wherein the alkyl linking group optionally includes one or more sites of unsaturation;

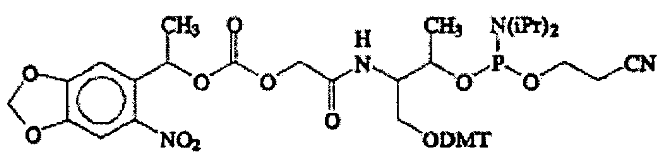
Y is selected from the group consisting of a dimethoxytrityl protecting group and a photoclevable protecting group;

Z is selected from the group consisting of a dimethoxytrityl protecting group and a photoclevable protecting group; and

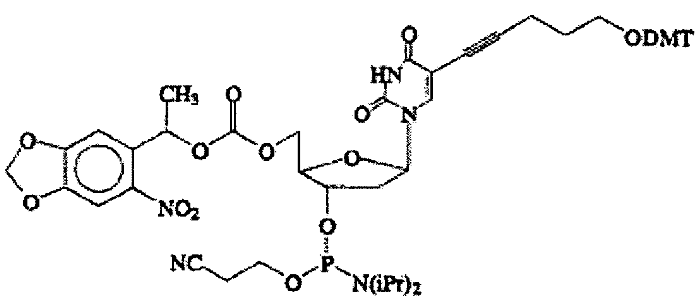
X is a nucleic acid integration element comprising a phosphorous atom.

34. (Withdrawn) The labeling linker of claim 33, wherein Z is the photoclevable group MeNPOC.

35. (Withdrawn) The labeling linker of claim 32, wherein the linker has the structure



36. (Withdrawn) The labeling linker of claim 32, wherein the linker has the



structure

37. (Previously Presented) The method of claim 39, wherein the labeled polymers comprise a label comprising a fluorescent moiety.

38. (Previously Presented) The method of claim 14, wherein the detectable label comprises a fluorescent moiety.

39. (Previously Presented) The method of claim 1, wherein each of the polymers further comprises a label, thereby forming labeled polymers.

40. (Previously Presented) A method of monitoring polymer array synthesis on a solid substrate comprising:

(i) synthesizing a preselected array of diverse polymers connected to cleavable linkers on a solid substrate, whereby the diverse polymers occupy different regions of the solid substrate and are spatially defined on the solid substrate on which the preselected array is synthesized;

(ii) cleaving diverse polymers from the solid substrate by cleaving the cleavable linkers, thereby creating a mixture of diverse unbound polymers; and

(iii) measuring presence of diverse unbound polymers as an indicator of the efficiency of the synthesizing step.

41. (Previously Presented) The method of claim 40, wherein each of the polymers further comprises a label, thereby forming labeled polymers.

42. (Previously Presented) The method of claim 41, wherein the labeled polymers comprise a label comprising a fluorescent moiety.

43. (Previously Presented) The method of claim 41, wherein each of the labeled polymers comprises a single isomeric label.

44. (Previously Presented) The method of claim 41, wherein the labeled unbound polymers are heterogeneous by number of monomeric units, and wherein the method further comprises separating the labeled unbound polymers by number of monomeric units.

45. (Previously Presented) The method of claim 41, wherein the labeled unbound polymers are heterogeneous by number of monomeric units, and wherein the method further comprises separating the labeled unbound polymers by charge using ion exchange chromatography.

46. (Previously Presented) The method of claim 41, wherein each of the labeled unbound polymers is heterogeneous by number of monomeric units, and wherein the method further comprises separating the labeled unbound polymers by number of monomeric units using capillary gel electrophoresis.

47. (Previously Presented) The method of claim 45, wherein the ion exchange chromatography is performed by HPLC.

48. (Previously Presented) The method of claim 45, wherein the ion exchange chromatography is performed by HPLC, and wherein the labeled unbound polymers are detected as they exit an ion exchange column.

49. (Previously Presented) The method of claim 40, wherein the polymer is an oligonucleotide.

50. (Previously Presented) A method for measuring the effect of altering a polymer array synthesis protocol, comprising:

(i) synthesizing a preselected array of diverse polymers occupying different regions on a solid support by a first synthesis protocol, wherein the diverse polymers are spatially defined on the solid support on which the preselected array is synthesized, thereby creating a reference array of polymers;

(ii) synthesizing a preselected array of diverse polymers occupying different regions on a solid support synthesized by a second synthesis protocol, wherein the diverse polymers are spatially defined on the solid support on which the preselected array is synthesized, and wherein the second synthesis protocol is different than the first synthesis protocol, thereby creating a test array of polymers;

(iii) cleaving separately the reference array of polymers and the test array of polymers, thereby creating a mixture of diverse cleaved polymers from the reference array and a mixture of diverse cleaved polymers from the test array;

(iv) comparing a measurement of presence of diverse cleaved polymers from the test array as an indicator of the efficiency of the second synthesis procedure with a measurement of presence of the mixture of diverse cleaved polymers from the reference array as an indicator of the efficiency of the first synthesis procedure, thereby determining whether a difference between the first and second synthesis procedures affects the efficiency of the second synthesis procedure.

51. (Previously Presented) The method of claim 50, wherein the test and reference polymers are oligonucleotides.

52. (Previously Presented) The method of claim 50, wherein the first synthesis protocol differs from the second synthesis protocol by a single variation.

53. (Previously Presented) The method of claim 50, wherein the reference polymers and the test polymers are attached to the solid substrate by a cleavable linker.

54. (Previously Presented) The method of claim 50, wherein the test and reference polymers comprise a detectable label.

55. (Previously Presented) The method of claim 54, wherein the label is a single isomeric label.

56. (Previously Presented) The method of claim 54, wherein the detectable label comprises a fluorescent moiety.

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